

**REMARKS**

The Office Action dated August 29, 2003, has been received and reviewed. Claims 1-22 are currently pending and under consideration in the above-referenced application. Each of claims 1-22 stands rejected.

Reconsideration of the above-referenced application is respectfully requested.

**Rejections Under 35 U.S.C. § 102(e)**

Claims 1, 2, 6, 7, and 10 through 22 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Wang, U.S. Patent No. 6,461,932. Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Wang describes a process for creating a trench-isolated semiconductor structure “using a pre-smoothing technique to avoid difficulties such as dishing and premature silicon-nitride removal that might otherwise occur during chemical-mechanical polishing...” (hereinafter “CMP”). Col. 4, ln. 48 – 51. The process includes providing a dielectric layer over a semiconductor surface, which is covered with a “smoothing layer” whose upper surface is smoother than the upper surface of the dielectric layer. Col. 6, ln. 29-31. The smoothing layer is applied either by a “deposition/spinning procedure” (Col. 6, ln. 52 – Col.7, ln. 14), a “deposition/flow” procedure (Col. 7, ln. 15-27), or a combination of these procedures (Col. 7, ln. 28-41). Wang acknowledges that the upper smoothing surface 62 of the smoothing layer 60 is merely “largely planar,” noting that the term “largely planar” includes the presence of “slight depressions in upper smoothing surface 62 at locations of the deepest parts of the depressed portion of upper dielectric surface 58.” Col. 6, ln. 32-37. The smoothing layer and the dielectric layer are then removed by CMP methods until a portion of the underlying semiconductor device is exposed. Col. 7, ln. 42 – Col.8, ln. 25.

Independent claim 1 is directed to a method for preparing a surface of a semiconductor device structure for planarization. The method of claim 1 includes, among other things, spreading a second material over a first material layer having a nonplanar surface so as to form a second material layer having a substantially planar surface.

Wang lacks any express or inherent description of spreading a second material layer over a first material layer so as to form a second material layer having a substantially planar surface, as recited in independent claim 1. Instead, Wang describes a smoothening layer 60 that may include “slight depressions” in the upper smoothening surface 62 thereof.

Accordingly, it is respectfully submitted that Wang does not anticipate each and every element of independent claim 1, as is required to maintain a rejection under 35 U.S.C. § 102(e). It is, therefore, respectfully submitted that, under 35 U.S.C. § 102(e), independent claim 1 is allowable over Wang.

It is also respectfully submitted that claims 2, 6, 7, and 10-22 are each allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

Claim 2 is additionally allowable because Wang lacks any express or inherent description that the smoothing layer 60 thereof comprises a stress buffer material. As explained at paragraph [0018] of the specification of the above-referenced application, a stress buffer material may “facilitate[] planarization . . . without causing substantial defects” in an underlying material layer. Wang lacks any express or inherent description that the smoothing layer 60 thereof facilitates planarization. Rather, Wang describes that smoothing layer 60 prevents the formation of depressions in trench dielectric regions (“dishing”) and/or the undesired removal of material underlying the dielectric material in the semiconductor structure, such as nitride or oxide layers, during CMP. Col. 2, ln. 9-27.

Claim 10, which depends from claim 2, is further allowable since Wang does not expressly or inherently describe that the smoothening layer 60 may be spread such that one valley of the underlying dielectric layer 56 may be at least partially filled while at least one peak of the underlying dielectric layer 56 may remain substantially uncovered. Rather, Wang clearly describes that, when applied, the smoothening layer 60 “completely fills the depressed portion of upper dielectric surface 58 above trench 54”. Col. 6, ln. 26-27; Fig. 4d. In fact, none of the

peaks of the dielectric layer 56 is exposed until the CMP process has begun. *See* col. 7, ln. 65 – col. 8, ln. 4.

Claim 13, which depends from claims 2, 10, 11, and 12, is additionally allowable since Wang includes no express or inherent description that the dielectric layer 56 may be etched with selectivity over the smoothening layer 60 thereof until a surface of at least one region of the dielectric layer 56 is in substantially the same plane as a surface of the smoothening layer 60. Rather, the exposed surfaces of the dielectric layer 56 and smoothening layer 60 of the semiconductor device structure of Wang are in substantially the same plane only after CMP of the smoothening layer 60 is partially completed. *See* col. 7, ln. 65 – col. 8, ln. 4; Fig. 4e.

Claim 15, which depends from claims 2, 10, 11, 12, and 13, is additionally allowable since Wang includes no express or inherent description that the dielectric layer 56 and the smoothening layer 60 may be etched at substantially the same rate so as to expose a surface of mask layer 44 adjacent a surface of a portion of the dielectric layer 56 in at least one recess, with the surfaces of the mask layer 44 and the dielectric layer 56 being located in substantially the same plane following such planarization. Rather, the description of Wang is limited to the use of CMP for this purpose.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(e) rejections of claims 1, 2, 6, 7, and 10-22 be withdrawn.

#### **Rejections Under 35 U.S.C. § 103(a)**

Claims 3, 4, 5, 8, and 9 stand rejected under 35 U.S.C. § 103(a).

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on

applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Wang in View of Yoshihara

Claims 3-5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang in view of U.S. Patent 6,117,486 to Yoshihara et al. (hereinafter "Yoshihara").

Claims 3-5 are each allowable, among other reasons, for depending either directly or indirectly from claim 1, which is allowable.

It is respectfully submitted that one of ordinary skill in the art would not have been motivated to combine the teachings of Wang with those of Yoshihara to provide a method of providing a *substantially planar upper surface* of a material applied over the top of a substrate having a *nonplanar* upper surface, such as a dielectric material. Such a configuration of layers *necessarily* requires the overlying material to have a *nonuniform* thickness. In particular, the overlying material must be thicker over recesses in the underlying material and thinner over protrusions in the underlying material. *See, e.g.*, Figs. 2, 7, 12 of the above-referenced application invention. In contrast, it is taught in Yoshihara that the method described therein will provide a material layer having a "predetermined" "uniform thickness" without any "ripples" therein. *See, e.g.*, Col. 2, ln. 33; Col. 11, ln. 48-54, 62; Fig. 9. A layer of such a nature only provides a planar upper surface when the underlying substrate also has a planar upper surface, which is not the case with the process recited in independent claim 1, from which claims 3-5 depend. Therefore, one of ordinary skill in the art would have had no reason to combine the teachings of Yoshihara with those of Wang.

It appears that any motivation to combine the teachings of Yoshihara and Wang in the manner that has been asserted could only have been improperly gleaned from the subject matter described in the application for the instant invention.

Moreover, it is respectfully submitted that a person of ordinary skill in the art at the time of the invention would have no reason to believe that combining the teachings of Wang and Yoshihara in the manner that has been asserted would have been successful. Again, use of the spin-on process taught in Yoshihara to form the smoothening layer 60 of Wang would have merely resulted in a structure with nonplanar smoothening layer 60 of substantially uniform

thickness, not in a material layer that has a substantially planar surface, as required by independent claim 1, from which claims 3-5 depend.

For these reasons, it is respectfully submitted that, under 35 U.S.C. § 103(a) each of claims 3-5 is allowable over Wang and Yoshihara, taken either together or separately.

Wang in View of Hsieh

Claims 8 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang (U.S. Patent No. 6,461,932) in view of Hsieh (U.S. Patent No. 6,228,711). Applicants respectfully traverse this rejection, as hereinafter set forth.

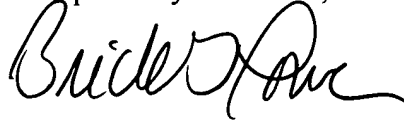
Claims 8 and 9 are both allowable, among other reasons, as respectively depending directly and indirectly from claim 1, which is allowable.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 103(a) rejections of claims 3-5, 8, and 9 be withdrawn.

**CONCLUSION**

It is respectfully submitted that each of claims 1-22 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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